

Notice of Allowability

Application No.	Applicant(s)
10/689,207	SHAO ET AL.
Examiner	Art Unit
Christine Duong	2616

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. This communication is responsive to 02/05/2008.
2. The allowed claim(s) is/are 1-4, 6-11 (renumbered 1-10 respectively).
3. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some* c) None of the:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 1) hereto or 2) to Paper No./Mail Date _____.
(b) including changes required by the attached Examiner's Amendment / Comment or in the Office action of
 Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. Notice of References Cited (PTO-892)
2. Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. Information Disclosure Statements (PTO/SB/08),
 Paper No./Mail Date _____
4. Examiner's Comment Regarding Requirement for Deposit
 of Biological Material
5. Notice of Informal Patent Application
6. Interview Summary (PTO-413),
 Paper No./Mail Date _____.
7. Examiner's Amendment/Comment
8. Examiner's Statement of Reasons for Allowance
9. Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Clifton D. Mueller on 07 February 2008.

The application has been amended as follows.

In the claims:

1. (currently amended) A method for selecting multiple paths between a server and a client in an overlay network having a plurality of nodes connected by links, the plurality of nodes including the server and the client, each path including a set of selected links, comprising the steps of:

measuring, in each node of the overlay network, quality of service metrics of each link directly connecting the node to an immediate neighboring node in the overlay network;

transmitting the quality of service metrics to the server;

maintaining, in the server, the quality of service metrics, a link correlation matrix based on the quality of service metrics, and a path correlation matrix based on the link correlation matrix, and in which the link correlation matrix is

$$Cr(L_{ij}, L_{mn}) = 1/2 + \frac{E[(L_{ij} - \bar{L}_{ij})(L_{mn} - \bar{L}_{mn})]}{2\sqrt{E(L_{ij}^2) - (\bar{L}_{ij})^2} \sqrt{E(L_{mn}^2) - (E(\bar{L}_{mn}))^2}},$$

where ij and mn are a pair of links connecting two nodes, E is an expected value, L_{ij} and L_{mn} are the quality of service metrics for link ij and link mn, an average L̄_{ij} = E(L_{ij}), and an average L̄_{mn} = E(L_{mn}); and

selecting, in the server, the multiple paths based only on the quality of service metrics, the link correlation matrix, and the path correlation matrix.

2. (original) The method of claim 1, further comprising:
streaming data from the server to the client via the multiple paths.
3. (previously presented) The method of claim 2, further comprising:
storing a copy of the streaming data only at the server.
4. (original) The method of claim 2, in which the streaming data are multimedia.
5. (canceled)
6. (currently amended) The method of claim 1, in which the quality of service metrics include bandwidth, latency, and packet loss rate of the link.
7. (original) The method of claim 1, in which the measuring, transmitting, maintaining, and selecting are performed dynamically and periodically over a time window.
8. (currently amended) The method of ~~claim 5~~ claim 1, in which the path correlation matrix is
$$Cr (Path_A, Path_B) = \sum_{a \in A} \sum_{b \in B} Cr(a, b),$$
where the path_A path_A includes a link set $a \in A$ and the path_B path_B includes a link set $b \in B.$
9. (currently amended) The method of claim 8, further comprising:
first selecting a first path based on the quality of service metrics;

updating an available bandwidth of each link according to previously selected paths;

determining a correlation cost (cc) for each link L with respect to a previous selected link set S of a path as

$$Cr_S^L = \sum_{a \in S} Cr(L, a);$$

combining the correlation cost and the quality of service metrics to obtain a cost for each link using a cost function

$$Cost_S^L = \alpha \cdot Cr_S^L + \sum_{i=1}^R \alpha_i W_r(i, j),$$

where W where W_r is the quality of service metrics, and α and α_i are weighting factors; and

selecting a next shortest path based on the updated cost $Cost_S^L$; and

repeating the updating, determining, combining, and selecting until the plurality of paths have been selected.

10. (currently amended) The method of claim 1, in which the link correlation matrix relates each link to all other links based on the quality of service metrics.

11. (previously presented) The method of claim 1, in which the path correlation matrix relates each possible path to all other possible paths.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Duong whose telephone number is (571) 270-1664. The examiner can normally be reached on Monday - Friday: 830 AM-6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema Rao can be reached on (571) 272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CTD 02/07/2008 CTD

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